

space station, additional propellants or other stores for the space station. Similarly, the large volume can be employed for return of satellites or other space equipment as desired.

We claim:

1. An aerospace vehicle comprising:

a body having substantial bilateral aerodynamic symmetry about the orthogonal planes extending longitudinally thereof;

a pair of aerodynamic fairings symmetrically located on opposite sides of said body substantially along one of the planes of symmetry for providing lift at hypersonic velocities;

a pair of fins, each of said fins being mounted on an outboard edge of one of said fairings and extending generally in the direction of lift therefrom;

a landing gear at the aft end of said body and movable between a first position within the low velocity region of the aerodynamic wake and a second position extending beyond the bottom of said body for landing.

2. An aerospace vehicle comprising:

a body having substantial bilateral aerodynamic symmetry about the orthogonal planes extending longitudinally thereof;

a pair of aerodynamic fairings symmetrically located on opposite sides of said body substantially along one of the planes of symmetry for providing lift at hypersonic velocities;

a pair of fins, each of said fins being mounted on an outboard edge of one of said fairings and extending generally in the direction of lift therefrom;

said body having a conical forward portion and a cylindrical aft portion;

said cylindrical portion including a blunt aft end for providing a low velocity region in an aerodynamic wake behind the body for providing a region of low aerodynamic heating; and

attitude control thrust engines mounted on the aft end of the body and movable between a first position beyond the side of said body for control use in space and a second position within the low velocity region of the aerodynamic wake for protection from aerodynamic heating.

3. An aerospace vehicle comprising:

a body having substantial bilateral aerodynamic symmetry about the orthogonal planes extending longitudinally thereof;

a pair of aerodynamic fairings symmetrically located on opposite sides of said body substantially along one of the planes of symmetry for providing lift at hypersonic velocities;

a pair of fins, each of said fins being mounted on an outboard edge of one of said fairings and extending generally in the direction of lift therefrom;

said body having a conical forward portion and a cylindrical aft portion; said cylindrical portion including a blunt aft end for providing a low velocity region in an aerodynamic wake behind the body for providing a region of low aerodynamic heating; and

a restartable rocket engine on the aft end of said body for propulsion, said engine including a large area ratio expansion bell for use in lower pressures of space; and means for jettisoning at least a portion of said expansion bell for reducing the area ratio of said engine for use in higher pressures within the atmosphere.

4. An aerospace vehicle comprising:

a body having substantial bilateral aerodynamic symmetry about the orthogonal planes extending longitudinally thereof;

a pair of aerodynamic fairings symmetrically located on opposite sides of said body substantially along one of the planes of symmetry for providing lift at hypersonic velocities;

a pair of fins, each of said fins being mounted on an outboard edge of one of said fairings and extending generally in the direction of lift therefrom;

said body having a conical forward portion and a cylindrical aft portion;

said cylindrical portion includes a blunt aft end for providing a low velocity region in an aerodynamic wake behind the body for providing a region of low aerodynamic heating; and

each of said fins having a substantial portion located aft of the aft end of said body; and

a pair of wing members, each of said wing members being movable between a first position within one of said fairings and a second position extending laterally from said fairing for providing lift at subsonic velocities.

5. An aerospace vehicle as defined in claim 4 further comprising:

landing gear at the aft end of said body and movable between a first position in the low velocity region of the aerodynamic wake and a second position extending beyond the bottom of said body for landing; and

attitude control thrust engines mounted on the aft end of the body and movable between a first position beyond the side of said body for control use in space and a second position in the low velocity region of the aerodynamic wake for protection from aerodynamic heating.

6. An aerospace vehicle as defined in claim 5 wherein said landing gear are pivotable so as to describe a conical path between a first position facing aft of said body in the low velocity region of the aerodynamic wake and a second position facing forwardly of said body for landing.

7. An aerospace vehicle comprising:

a lifting vehicle body including a blunt portion on the aft end thereof for providing a low velocity flow region in an aerodynamic wake behind the body; and

a pair of landing gears movable from within the wake to a position extending generally downwardly beyond a side of the body for landing, said landing gears being located at the aft end and on opposite sides thereof and extending in the same direction transverse to said body for landing.

8. An aerospace vehicle as defined in claim 7 wherein said landing gear is pivotable about an axis extending transversely of said body to describe a conical path between the first and second positions.

9. An aerospace vehicle as defined in claim 7 further comprising a movable element including an assembly of reaction thrust engines for control of said vehicle in space.

10. A reentry vehicle for use in the hard vacuum of space and also within the atmosphere comprising:

an aerodynamic lifting body;

a reaction thrust engine having a nozzle on the aft end of said body for reaction propulsion in hard vacuum of space; and

means for removing a portion of said nozzle while said engine is operating to cause the propulsion gases to expand to a higher ambient pressure that is less than chamber pressure but higher than vacuum to prevent over expansion when operating in the earth's atmosphere.

11. A reentry vehicle as defined in claim 10 wherein said engine comprises a rocket with a large area ratio expansion bell; and said means for reducing area ratio comprises release means for jettisoning at least a portion of said expansion bell.

12. In combination:

a substantially symmetrical rocket booster;

an aerospace vehicle having a body with substantial bilateral aerodynamic symmetry about two orthogonal planes extending longitudinally thereof, mounted on said rocket booster for minimized side loading during launching;

a pair of aerodynamic structures symmetrically located on opposite sides of said body substantially along one of the planes of symmetry for providing lift at hypersonic velocities without disturbing launch symmetry; and

a pair of fins, each of said fins being mounted on the outboard edge of one of said structures and extending generally in the direction that lift would be produced.

13. An aerospace vehicle comprising: